in order to obtain the 255 original bits. The number of data bits remains constant; i.e., a current data bit at the input of this post-processing yields exactly one original bit with the aid of past input bits.

The coding and decoding methods described can be used both in base stations BS and in mobile stations MS.

Although the present invention has been described with reference to specific embodiments, those of skill in the art will recognize that changes may be made thereto without departing from the spirit and scope of the invention as set forth in the hereafter appended claims.

ABSTRACT OF THE DISCLOSURE

A method, base station and subscriber station which use recursive systematic codes (RSC codes) for channel coding in GSM mobile radio systems. In addition ~~contrast to previous conceptions~~, these RSC codes also can be used on the basis of the hardware installed in existing GSM mobile radio systems. The RSC codes can be introduced during the introduction of an adaptive multirate coder.

In the claims:

On page 25, cancel line 1, and substitute the following left-hand justified heading therefor:

We Claim as Our Invention:

Please cancel claims 1-19, without prejudice, and substitute the following claims therefor:

14 20. A method for channel coding in a GSM mobile radio system, wherein the channel coding uses recursive systematic codes and is performed at a transmitting end for transmission via a radio interface between a base station and a subscriber station, the method comprising the steps of:

arranging voice information to be coded based on at least one of a sensitivity of the voice information to transmission errors and a priority associated with the voice information;

subdividing the voice information into at least first and second voice information;

performing a channel coding for the first voice information which, in a first coding step, uses error protection codes for a cyclic redundancy check and, in a second coding step, uses recursive systematic codes comprising a numerator polynomial and a denominator polynomial; and

performing a channel coding for the second voice information which uses recursive systematic codes comprising a numerator polynomial and a denominator polynomial.

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~~21~~. A method for channel coding in a GSM mobile radio system as claimed in claim ~~20~~ 14, the method further comprising the steps of:

generating the error protection codes for the cyclic redundancy check using a generator polynomial

$$g(D)=D^6+D^5+D^3+D^2D^1+1.$$

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~~22~~. A method for channel coding in a GSM mobile radio system as claimed in claim ~~20~~ 14, the method further comprising the step of:

generating the recursive systematic codes using a generating polynomial

$$g(D)=1+D+D^3+D^4/1+D^3+D^4 \text{ or}$$

$$g(D)=1+D+D^4+D^6/1+D^2+D^3+D^5+D^6.$$

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~~23~~. A method for channel coding in a GSM mobile radio system as claimed in claim ~~20~~ 14, the method further comprising the step of:

performing a channel decoding comprising successive nonrecursive individual steps at a receiving end.

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~~24~~. A method for channel coding in a GSM mobile radio system as claimed in claim ~~23~~ 17, the method further comprising the step of:

performing post-processing based on the denominator polynomial after channel decoding with the numerator polynomial.

19
25. A method for channel coding in a GSM mobile radio system as claimed in claim 24, 18 wherein the post-processing is performed by a programmer.

20
26. A method for channel coding in a GSM mobile radio system as claimed in claim 14, 20 the method further comprising the step of:

obtaining a priori knowledge from previous decoding at a receiving end and using the a priori knowledge in subsequent channel decoding.

21
27. A method for channel coding in a GSM mobile radio system as claimed in claim 14, 20 the method further comprising the step of:

switching off completely the channel decoding in a subscriber station and using, thereafter, transmitted systematic data bits which are not channel coded.

22
28. A method for channel coding in a GSM mobile radio system as claimed in claim 14, 20 the method further comprising the steps of:

determining a transmission quality during a channel estimation; and

switching the channel decoding, depending on the transmission quality, at least one of on and off.

23
29. A method for channel coding in a GSM mobile radio system as claimed in claim 14, 20 the method further comprising the step of:

using the recursive systematic codes in an adaptive mutirate coder wherein the coder is selected in accordance with transmission conditions.

24
30. A method for channel coding in a GSM mobile radio system as claimed in claim 14, 20 the method further comprising the step of:

using at least one polynomial of a nonrecursive systematic code previously used in the GSM mobile radio system as one of the numerator and denominator polynomials of the recursive systematic codes.

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31. A base station for a GSM mobile radio system which performs, for transmission via a radio interface to a subscriber station, a channel coding which uses recursive systematic codes, comprising:

an arrangement part for arranging voice information to be coded based on at least one of a sensitivity of the voice information to transmission errors and a priority which is associated with the voice information, and for subdividing the voice information into at least first and second voice information;

a first voice channel coding part for first voice information wherein channel coding is performed which, in a first coding step, uses error protection codes for a cyclic redundancy check and, in a second coding step, uses recursive systematic codes comprising a numerator polynomial and a denominator polynomial; and

a second channel coding for the second voice information wherein channel coding is performed which uses recursive systematic codes comprising a numerator polynomial and a denominator polynomial.

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32. A base station for a GSM mobile radio system as claimed in claim 25 31, wherein the error protection codes for the cyclic redundancy check are generated using a generator polynomial

$$g(D)=D^6+D^5+D^3+D^2+D^1+1.$$

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33. A base station for a GSM mobile radio system as claimed in claim 25 31, wherein the recursive systematic codes are generated using a generator polynomial

$$g(D)=1+D+D^3+D^4/1+D^3+D^4 \text{ or}$$

$$g(D)=1+D+D^4+D^6/1+D^2+D^3+D^5+D^6.$$

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34. A subscriber station for a GSM mobile radio system which performs, for transmission via a radio interface to a base station, a channel coding which uses recursive systematic codes, comprising:

an arrangement part for arranging voice information to be coded based on at least one of a sensitivity of the voice information to transmission errors and a priority which is associated with the voice information, and for subdividing the voice information into at least first and second voice information;

a first channel coding part for first voice information wherein channel coded is performed which, in a first coding step, uses error protection codes for a cyclic redundancy check and, in a second coding step, uses recursive systematic codes comprising a numerator polynomial and denominator polynomial; and

a second channel coding part for the second voice information wherein channel coding is performed which uses recursive systematic codes comprising a numerator polynomial and a denominator polynomial.

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35. A subscriber station for a GSM mobile radio system as claimed in claim ~~34~~ 28, wherein the error protection codes for the cyclic redundancy check are generated using a generator polynomial

$$g(D)=D^6+D^5+D^3+D^2+D^1+1.$$

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36. A subscriber station for a GSM mobile radio system as claimed in claim ~~34~~ 28, wherein the recursive systematic codes are generated using a generator polynomial

$$g(D)=1+D+D^3+D^4/1+D^3+D^4 \text{ or}$$

$$g(D)=1+D+D^4+D^6/1+D^2+D^3+D^5+D^6.$$

31

37. A subscriber station for a GSM mobile radio system as claimed in claim ~~34~~ 28, further comprising:

a channel decoder which can be switched off.

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38. A subscriber station for a GSM mobile radio system as claimed in claim ~~37~~ 31, wherein the channel decoder, in a switched-off state, forwards transmitted data which is not channel coded.